

NON-PUBLIC?: N  
ACCESSION #: 9210070038  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Joseph M. Farley Nuclear Plant - Unit 2 PAGE: 1 OF 4

DOCKET NUMBER: 05000364

TITLE: Reactor Manually Tripped Following Los of Steam Generator Feed Pump

EVENT DATE: 05/25/92 LER #: 92-007-01 REPORT DATE: 10/01/92

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(iv), OTHER: Voluntary

LICENSEE CONTACT FOR THIS LER:

NAME: R. D. Hill, General Manager - TELEPHONE: (205) 899-5156  
Nuclear Plant

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

At 0545 on 5-25-92, while operating at 100 percent power, the Unit 2 reactor was manually tripped following the loss of the 2A steam generator feedwater pump (SGFP). The 2A SGFP tripped due to low auto stop oil pressure. Investigation revealed that the low auto stop oil pressure was caused by degradation of the lube oil pumps and excessive water in the lube oil system for the 2A SGFP. The lube oil pump degradation was due to the degraded material condition of the impeller coupling and keyway and inadequate technical manual guidance on assembling the pump impellers. One source of water intrusion has been identified as water inleakage past the shaft seals while the SGFP was not rotating. The major source of water intrusion has been identified as condensation from a small gland sealing steam leak that had become trapped by the turbine insulation and drawn into the oil.

The 2A SGFP bearing oil seals were replaced to reduce shaft leakage into the oil system through the bearing housing. All lube oil pumps for the 2A SGFP were disassembled, cleaned, inspected, repaired and reassembled. The oil sump was cleaned and filled with new oil. The bearing oil pressure, auto stop oil pressure, oil pump discharge pressure and the oil pump control circuit voltage were instrumented with recorders for monitoring.

Following return of the 2A SGFP, the water intrusion from the gland seal system was identified and corrected by rearrangement of the turbine insulation. The unit was returned to power operation at 0549 on 05-26-92.

END OF ABSTRACT

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#### Plant and System Identification

Westinghouse - Pressurized Water Reactor  
Energy Industry Identification System codes are identified in the text as XX!.

#### Summary of Event

At 0545 on 5-25-92, while operating at 100 percent power, the Unit 2 reactor was manually tripped following the loss of the 2A steam generator feedwater pump (SGFP). The 2A SGFP tripped due to low auto stop oil pressure. Investigation revealed that the low auto stop oil pressure was caused by degradation of the lube oil pumps and excessive water in the lube oil system for the 2A SGFP SL!.

#### Description of Event

Unit 2 was operating at 100 percent power on 5-25-92 when the 2A SGFP miscellaneous annunciator alarmed at 0544. The 2A SGFP speed was decreasing so a ramp down was initiated in accordance with FNP-2-AOP-13.0 (Loss of Main Feedwater). However, steam generator water levels continued to decrease and the reactor was manually tripped at 0545 on 5-25-92.

Following the trip, the operators implemented FNP-2-EOP-0 (Reactor Trip or Safety Injection) and FNP-2-ESP-0.1 (Reactor Trip Response). The unit was maintained in a stable condition in Mode 3 (Hot Standby).

After the reactor trip, it was determined that the 2A SGFP had tripped due to low auto stop oil pressure. It was noted that both AC bearing oil pumps for the 2A SGFP were running which indicated that a drop in system pressure had occurred. An investigation was performed to determine the cause of the trip. The auto stop oil and low bearing oil pressure set points were tested. The mechanical system was reviewed to consider possible blockages or other items which could affect control oil pressure. This included inspecting the bearing oil relief back pressure regulator, and inspecting the lube oil strainers for blockage. Additionally, the trip logic and the bearing oil pump start logics were checked. These checks did not reveal a conclusive cause of the feed pump trip. Therefore, a monitoring plan, which included installing instrumentation devices for various parameters, was developed to verify the proper operation of the SGFP to the extent possible before returning to power.

The unit returned to power operation at 0549 on 5-26-92.

Operation of the 2A SGFP and its oil system was monitored during reduced power operations. No anomalies of the oil system were observed during this time period. The decision was made to return to full power operation.

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At 0358 on 05-29-92, with the unit at 72 percent power, the 2A SGFP tripped again on low auto stop oil pressure. The 2A SGFP trip did not result in a reactor trip. The instrumentation installed for monitoring the SGFP indicated that the auto stop oil and bearing oil pressure had spiked low causing the trip. The feedwater pump was isolated for maintenance and an inspection of the oil system revealed water in the lube oil system and degradation of the oil pumps.

The 2A SGFP and its lube oil system were inspected, repaired and returned to service. Additional water ingress was experienced. Subsequent investigation discovered another water source to be condensation from a small gland sealing steam leak on the turbine shaft being trapped by insulation and drawn into the oil. Removal of portions of this insulation has greatly reduced the overall water intrusion. After additional problems on 5-29-92 it was determined that the oil pump coupling had slipped allowing the oil pump impeller to slip vertically along the shaft axis inside the pump casing. This movement occurred sporadically resulting in intermittent drops in oil pressure.

Cause of Event

Investigation of the 2A SGFP oil system revealed water in the lube oil system and slippage of the oil pump impeller inside the pump casing to be the causes of the 2A SGFP low auto stop oil trip on 5-29-92. The water ingress was due primarily to condensation from a small gland sealing steam leak on the turbine shaft being trapped by insulation and drawn into the oil. The cause of the impeller slippage was attributed to inadequate technical manual guidance for the reassembly of the pump impeller and the degraded material condition of the impeller coupling and keyway.

The 2A SGFP trip on 05-25-92 resulted in a manual reactor trip.

#### Reportability Analysis and Safety Assessment

This event is reportable because of the actuation of the reactor protection system. After the trip, the following safety systems operated as designed:

- Main feedwater was isolated by automatic closure of the flow control valves and bypass valves,
- Auxiliary feedwater pumps started automatically and provided flow to the steam generators, and
- Pressurizer heaters and spray valves operated automatically as required to maintain system pressure.

The source range nuclear detectors were manually energized prior to reaching the automatic reset setpoint.

There was no effect on the health and safety of the public.

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#### Corrective Action

The 2A SGFP bearing oil seals were replaced to reduce shaft leakage into the oil system through the bearing housing. The turbine insulation was modified to minimize water ingress through the bearing housing. Appropriate maintenance procedures will be revised to require an inspection of the SGFP turbine insulation prior to startup. All lube oil pumps for the 2A SGFP were disassembled, cleaned, inspected, repaired and reassembled. The oil sump was cleaned and filled with new oil. The bearing oil pressure, auto stop oil pressure, oil pump discharge pressure and the oil pump control circuit voltage were instrumented with recorders for monitoring.

In addition, the coupling nuts for the 2A SGFP #1 and #2 main oil pumps were modified with an upgraded locking set screw arrangement to prevent the coupling nut from loosening. The 2B SGFP main oil pumps were visually inspected to ensure their coupling nuts were secure. Guidance has been placed in the SGFP technical manual to reflect the locking set screw modification and provide clearer instructions for reassembly of the pump impeller.

The 2B SGFP main oil pumps will be modified with the upgraded locking set screw arrangement during the next outage or power reduction of sufficient length. The next Unit 2 outage is currently scheduled for October, 1993.

The Unit 1 SGFP main oil pumps will be inspected and the couplings modified with an additional set screw during the Unit 1 outage scheduled to commence in September, 1992.

#### Additional Information

This event would not have been more severe if it had occurred under different operating conditions.

No similar events have been reported by FNP.

ATTACHMENT 1 TO 9210070038 PAGE 1 OF 1

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Southern Nuclear Operating Company  
J. D. Woodard the southern electric system  
Vice President 10 CFR 50.73  
Farley Project

October 1, 1992

Docket No. 50-364

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

Joseph M. Farley Nuclear Plant - Unit 2  
Licensee Event Report No. LER 92-007-01

Gentlemen:

Joseph M. Farley Nuclear Plant, Unit 2, Licensee Event Report No. LER 92-007-00 was previously submitted on June 22, 1992. Further evaluation of this event has led to a revision to the cause of the event and to additional corrective actions. Thus, attached is Revision 1 to LER 92-007-00.

Respectfully submitted,

J. D. Woodard  
EFB:map0919

Attachment

cc: Mr. S. D. Ebnetter  
Mr. G. F. Maxwell

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